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REGULATING AUTOMOBILES
The Consequences for Consumers

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Abstract

Automobiles are ubiquitous. Most Americans take at least one car trip every day to get to work or school or to run household errands. The automobile has also never been safer. New technology has brought car frames that crumple to reduce the impact of a crash, airbags that cushion the blow of an accident, and cameras that show drivers what is behind the vehicle. In addition, rising standards of living have allowed consumers to purchase more safety equipment and to question the environmental impact of cars. While cleaner, safer automobiles certainly have benefits, as economists, we must ask, what do all these regulations cost the consumer? Costs arise from three sources: workplace safety regulation, environmental regulation, and consumer safety regulation. In this paper, we examine each area in turn, focusing on how the cost of regulations impacts the average automobile consumer.

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Regulating Automobiles: The Consequences for Consumers

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I. Introduction

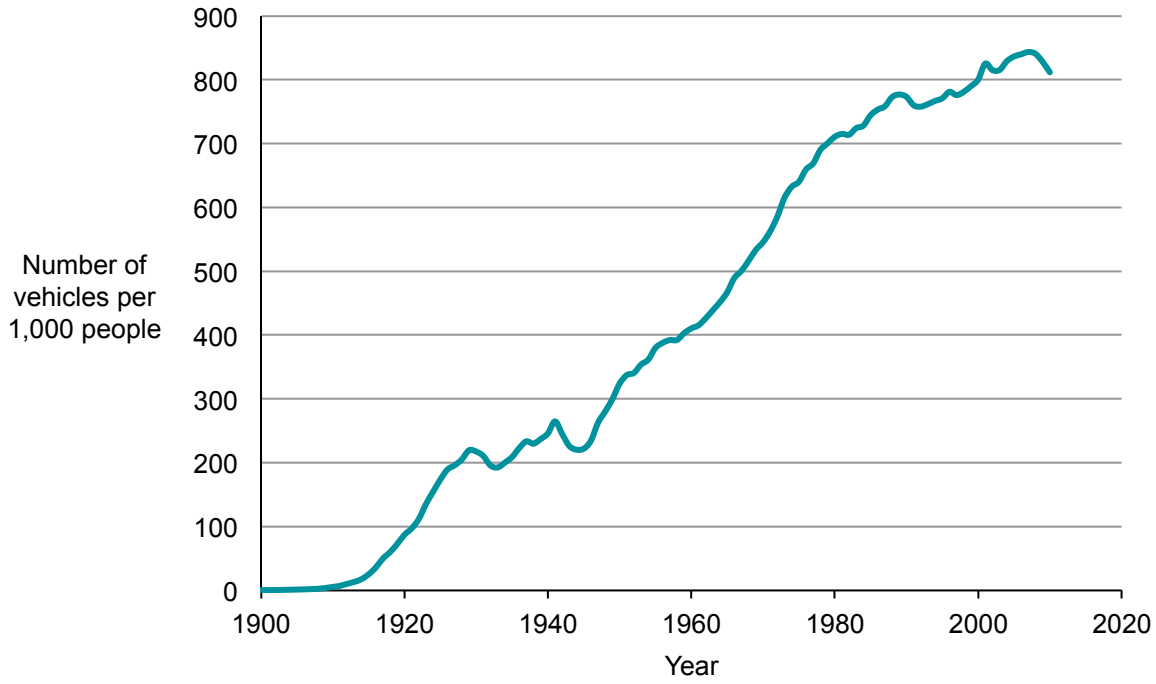
A popular argument for regulation holds that leaving consumers and manufacturers to their own devices would lead to undesirable outcomes. First, in seeking to maximize profits, manufacturers may deceive customers into believing cars are safer than they actually are, and they might reduce manufacturing costs by sacrificing safety. Second, because both manufacturers and consumers are seeking the best deal for themselves, they may impose costs on third parties not involved in the transaction. For example, a buyer might wish to purchase a less expensive car that has poor environmental performance, rationalizing that one car, among the many thousands in the immediate area, can have no real impact on the environment. The first scenario involves unethical and illegal business practices. The second is a classic public goods problem resulting in negative externalities. While these problems may be classic market failures that necessitate government intervention, the regulations purporting to provide solutions come at a cost. While regulations perhaps impose that cost more directly on the manufacturer, the consumer ultimately bears it, at least in part, in the form of higher prices.

Automobiles have served pivotal roles in Americans' lives throughout the past century. Although initially only the wealthiest individuals owned automobiles, Henry Ford's mass production of automobiles in the early 20th century made them affordable for less wealthy families.[1] The affordability and convenience of automobiles, along with their relative cleanliness, led them to quickly replace horses as the dominant mode of transportation in the United States. In 1920 Americans owned twice as many horses as automobiles, but by 1930

[1] Michael L. Berger, *The Automobile in American History and Culture: A Reference Guide* (Westport, CT: Greenwood Press, 2001), xvii–xviii.

they owned twice as many automobiles as horses.[2] By 1927 half of American families owned at least one automobile and by 1970 that number had grown to 83 percent.[3] Figure 1 shows the increasing prevalence of automobiles in the United States over the past century, as the number of automobiles per 1,000 Americans increased from less than one in the early 1900s to more than 800 today.

Figure 1. Vehicles per 1,000 People in the United States



Source: "Vehicles per Thousand People in the United States, 1990–2010," table 3.6 in Stacy C. Davis, Susan W. Diegel, and Robert G. Boundy, *Transportation Energy Data Book*, 31st ed. (Oak Ridge, TN: Oak Ridge National Laboratories, 2012), 3–10, http://info.ornl.gov/sites/publications/files/Pub37730.pdf.

[2] Ibid., xxiii.
[3] Ibid., xxvi.

By 2009, the United States was home to 209.6 million licensed drivers[4]—accounting for over 85 percent of the population age 16 and over in that year[5]—and had over 246 million registered private and commercial motor vehicles.[6] In 2011 Americans purchased over 12.7 million new automobiles,[7] as well as 15.6 million used automobiles.[8] Automobile-related expenses including purchase payments, fuel, motor oil, maintenance, repairs, and insurance accounted for nearly 17 percent of the average American consumer's annual expenditures in 2012.[9]

Automobiles are also by far the most popular mode of transportation in the United States. Automobile travel accounted for 87 percent of all passenger miles traveled in 2009, with air travel accounting for 12 percent and travel by railroad and other modes of transportation accounting for 1 percent.[10] The Federal Highway Administration estimates that the average American drives nearly 13,500 miles each year[11]—the equivalent of driving from New York City to Los Angeles nearly five times.[12]

The pervasiveness of automobiles means that their regulation affects nearly everyone in the nation. Such regulation imposes standards for worker safety, consumer safety, and

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[4] US Census Bureau, "State Motor Vehicle Registrations, 1990 to 2009, Motorcycle Registrations and Licensed Drivers by State: 2009," table 1098 from *Statistical Abstract of the United States: 2012*, accessed October 28, 2013, http://www.census.gov/compendia/statab/2012/tables/12s1098.pdf.

[5] Authors' calculations. The number of people age 16 and over was determined by adding the number of people age 18 and over to half of the number of people age 14–17, since the Census did not provide the exact number of people age 16 and over. US Census Bureau, "Incestral Resident Population by Sex and Age: 2001 to 2009," table 8 from *Statistical Abstract of the United States: 2012*, accessed October 28, 2013, http://www.census.gov/compendia/statab/2012/tables/12s0008.pdf.

[6] US Census Bureau, "State Motor Vehicle Registrations."

[7] National Automobile Dealers Association, *State-of-the-Industry Report* (McLean, VA: NADA, 2012), 3, http://www.nada.org/NR/rdonlyres/C1C58F5A-BE0E-4E1A-9B56-1C3025B5B452/0/NADADATA2012Final.pdf.

[8] Ibid., 11.

[9] Authors' calculations. Calculated using data from US Bureau of Labor Statistics, US Department of Labor, "Quintiles of Income before Taxes: Annual Expenditure Means, Shares, Standard Errors, and Coefficient of Variation, Consumer Expenditure Survey, 2012," table 1101 from *Consumer Expenditure Survey*, September 2013, http://www.bls.gov/cex/2012/combined/quintile.pdf.

[10] Bureau of Transportation Statistics, *Pocket Guide to Transportation 2012*, 15, table 3-2, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/pocket_guide_to_transportation/2012/pdf/entire.pdf.

[11] Federal Highway Administration, "Average Annual Miles per Driver by Age Group," April 4, 2011, http://www.fhwa.dot.gov/ohim/onh00/bar8.htm.

[12] The distance was calculated using Google Maps.

environmental impacts. As with all regulations, producers, consumers, and industry workers share these costs, though usually not equally.

II. Industry Regulations

The main regulations that affect the automobile industry, and ultimately the price that consumers pay for an automobile, come from the Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), and the National Highway Traffic Safety Administration (NHTSA), a part of the United States Department of Transportation. These regulations relate to workplace safety, the environment, and consumer safety.

Workplace Safety Regulations

Workplace safety regulations may appear to only affect automobile producers. Extensive regulations direct and guide manufacturers with regard to work environments and hazards. Additionally, manufacturers face fines and penalties for failure to comply with safety regulations. Because manufacturers typically have comparatively dangerous workplaces, they face more stringent federal standards to prevent workplace injuries and fatalities than other industries do. The economic rationale for such regulation is that workers face asymmetric information in choosing where to work—that is, they presumably do not have sufficient information about the dangers associated with any particular job.[13] Furthermore, some argue that even with accurate information, workers are likely to underestimate the risk associated

[13] Pouliakas Konstantinos and Theodossiou Ioannis, "The Economics of Health and Safety: An Interdisciplinary Review of the Theory and Policy" (University of Aberdeen Business School Working Paper, Munich Personal RePEc Archive Paper No. 28591, October 2010), 17, http://mpra.ub.uni-muenchen.de/28591/3/MPRA_paper_28591.pdf.

with any particular job, and therefore the government must take proactive measures to ensure their protection.[14]

This variety of regulation, while not unique to the automobile industry, raises producers' costs and therefore raises consumers' costs. The effects of workplace safety regulations on automobile prices are notable. For example, suppose it costs $10,000 to produce a given automobile, but because of extra, mandated worker-safety equipment, that cost increases to $11,000. The manufacturer will not be able to sell the car for less than $11,001 and still net a profit, whereas before it could have sold the car for $10,500. The higher costs for producers thereby raise costs for consumers.

According to OSHA, the workplace safety regulations shown in table 1 apply to the automotive sector, which includes the manufacturing of motor vehicles and car bodies, truck and bus bodies, truck trailers, and motor homes.

Table 1. OSHA's Automotive Sector Workplace Safety Regulations

Number	Name	Description
1904.1	Partial exemption for employers with 10 or fewer employees	Employers with 10 or fewer employees need not keep OSHA records unless specifically instructed otherwise
1910.101	Compressed gases (general requirements)	Requires employers to inspect gas containers to ensure they are in safe condition
1910.102	Acetylene	Establishes requirements for the production, use, and transport of acetylene
1910.106	Flammable liquids	Requires the safe production, storage, and use of flammable liquids
1910.107	Spray finishing using flammable and combustible materials	Requires employers to take measures to prevent injuries resulting from aerosol finishing
1910.12	Hazard communication	Requires that employers and employees be informed of dangers associated with chemicals in the workplace
1910.124	General requirements for dipping and coating operations	Establishes requirements for entering dip tanks, and requires that employees know first-aid procedures for dipping and coating hazards

[14] Ibid., 18.

Number	Name	Description
1910.132	General requirements (personal protective equipment)	Requires personal protective equipment to be provided, used, and stored in ways that minimize risks to workers
1910.133	Eye and face protection	Requires employers to provide and require eye and face protection in situations where employees' eyes and faces are subject to injury
1910.134	Respiratory protection	Requires employers to control air quality in workplaces and to provide respirators to workers when air quality controls are insufficient
1910.138	Hand protection	Requires employers to provide and require hand protection in situations where employees' hands are subject to injury
1910.141	Sanitation	Establishes waste disposal, pest control, and general cleanliness requirements for workplaces and restrooms
1910.146	Permit-required confined spaces	Requires employers to safeguard against injury caused by entry into certain confined spaces
1910.147	Control of hazardous energy	Requires safeguards for machines that could cause injury when started due to stored energy
1910.151	Medical services and first aid	Requires employers to make medical personnel and equipment available to workers
1910.157	Portable fire extinguishers	Requires that employers make portable fire extinguishers readily available to workers
1910.178	Powered industrial trucks	Establishes design and construction requirements for industrial trucks
1910.179	Overhead and gantry cranes	Establishes design and use requirements for cranes
1910.184	Slings	Establishes guidelines for the use of slings in manufacturing
1910.212	General requirements for all machines	Establishes guidelines for machine guarding, portable power tools, containers, and blades
1910.215	Abrasive wheel machinery	Generally requires safety guards for machines with abrasive wheels
1910.217	Mechanical power presses	Establishes guarding and construction requirements for mechanical power presses
1910.219	Mechanical power-transmission apparatus	Establishes design and construction requirements for power transmission belts
1910.22	General requirements (walking-working surfaces)	Requires clean, dry, and sanitary workplaces, including aisles, passageways, covers, and guardrails
1910.23	Guarding floor and wall openings and holes	Requires guards for stairways, ladders, and openings in walls and floors
1910.242	Hand and portable powered tools and equipment, general	Requires employers to keep in safe condition tools and equipment used by employees
1910.243	Guarding of portable powered tools	Establishes design requirements for portable power tools
1910.25	Portable wood ladders	Establishes construction, maintenance, and use requirements for wood ladders
1910.252	General requirements (welding, cutting, and brazing)	Requires certain precautions from firms in which welding, cutting, and brazing occurs
1910.253	Oxygen-fuel gas welding and cutting	Requires employers to guard against explosions resulting from the mixing of air oxygen and fuel gases
1910.254	Arc welding and cutting	Establishes requirements for the installation and use of arc welding equipment
1910.255	Resistance welding	Establishes requirements for the installation and use of resistance welding equipment

Number	Name	Description
1910.30	Multiple business establishments	Requires employers to maintain separate OSHA logs for all establishments that are expected to operate for one year or more
1910.304	Wiring design and protection	Requires that people who engage in wiring have a minimum level of knowledge about wiring
1910.305	Wiring methods, components, and equipment for general use	Establishes guidelines for electrical wiring
1910.334	Use of equipment	Establishes requirements for the use of electrical appliances and equipment
1910.335	Safeguards for personnel protection	Requires employers to provide and require the use of protective equipment for employees using certain electrical appliances
1910.36	Design and construction requirements for exit routes	Requires exit routes to be a certain size and width, and specifies the types and quality of materials that can be used to construct exit routes
1910.37	Maintenance, safeguards, and operational features for exit routes	Requires employers to provide safe and accessible exit routes and establishes requirements for their installation and maintenance
1910.95	Occupational noise exposure	Requires employers to minimize noise levels and to provide protective equipment against noise if other controls are insufficient
10910.38	Emergency action plans	Requires employers to have plans for addressing certain emergencies

Source: Occupational Safety & Health Administration, frequently cited standards, accessed March 16, 2013, https://www.osha.gov/pls/imis/citedstandard.html. SIC codes are 3711, 3713, 3715, and 3716, for motor vehicles and passenger car bodies, truck and bus bodies, truck trailers, and motor homes, respectively.

As in most other industries, automobile manufacturers must abide by regulations that mandate specific safety measures to protect their employees. Under many circumstances, abiding by such regulations proves exorbitant for employers since regulations force them to incur costs to mitigate risks that they would not mitigate if not for regulation. An example is the "control of hazardous energy" rule, which Kip Viscusi and Ted Gayer conclude costs over $100 million per life saved.[15] The increased expenditures by producers, foregone wages of workers, and higher prices that consumers pay for enhanced safety most likely cost society more than the benefits provided in the form of lower probability of a fatal workplace accident. In other words, perhaps

[15] W. Kip Viscusi and Ted Gayer, "Safety at Any Price?," *Regulation* 25, no. 3 (2002): 58, http://www.cato.org/sites/cato.org/files/serials/files/regulation/2002/10/v25n3-12.pdf.

the $100 million could be used to save many more lives if applied in more effective ways than those determined by legislation.

Some of these regulations, however, may not affect either producers' or consumers' costs. Manufacturers would still mitigate many risks in the absence of regulation, because a worker injury or death resulting from an unsafe workplace imposes tremendous costs. When a worker is injured or dies on the job, the employer loses the value of that worker's productivity, which requires the employer to expend resources to replace that worker. A dangerous workplace also can result in bad publicity for a firm, causing consumers to patronize competing firms, and it can generate increased costs from lawsuits and workers' compensation coverage. Most importantly, workers demand higher compensation to work in comparatively dangerous workplaces, and workplaces that are especially dangerous may struggle to attract workers even at high levels of compensation since the compensation may not offset the risk of injury or death.[16] Therefore, workplace regulations impose costs on consumers only to the extent that they require employers to spend more on risk mitigation than they would otherwise, which occurs when the cost of additional safety measures exceeds their benefits.

Environmental Regulations

Environmental regulations also affect automobile consumers. As with health and safety regulations, environmental regulations affect the industry at the production level by requiring it to comply with factory emissions standards and hazardous waste regulations, to name only a

[16] Deanna H. Matthews and Lester B. Lave, "Evaluating Occupational Safety Costs and Policy in an Input–Output Framework," in *Improving Regulation: Cases in Environment, Health, and Safety*, ed. Paul S. Fischbeck and R. Scott Farrow (Washington, DC: RFF Press, 2001), 361.

couple of examples. Specific product regulations compound this effect. The better-known regulations that affect the automobile industry are federal emissions control and fuel economy standards, both of which attempt to reduce the harmful environmental impact of driving.

Economists often recognize pollution as a classic example of a negative externality, meaning a situation in which the buyers and sellers of products impose costs on others who are not part of the transaction. The costs to society of such transactions are therefore higher than the costs to the individuals making the transaction, so more pollution occurs than is desirable from society's standpoint.[17] Some economists rationalize government intervention in such instances in order to reduce pollution,[18] since in the absence of such intervention people would presumably pollute excessively.

The Clean Air Act of 1970, which expanded the 1967 Air Quality Act, sought to address air pollution. It establishes standards for servicing motor vehicle air conditioners, regulates emissions resulting from surface and other coatings of automobiles and their parts, regulates emissions from engine test cells and stands, and establishes maximum emissions levels for several pollutants based on vehicle type. Specifically, title II of the act imposes vehicle emission standards and prohibits the production of engines requiring leaded gasoline.[19]

In a January 1993 report, the EPA reported that although emissions per car had fallen significantly since the 1970s, ozone levels had not fallen because the number of cars on the road and the miles traveled per car had increased substantially.[20] This result is not surprising

[17] Paul A. Samuelson and William D. Nordhaus, *Microeconomics*, 18th ed. (Boston: McGraw-Hill Irwin, 2005), 370–74.
[18] See, for example, Sjak Smulders and Raymond Gradus, "Pollution Abatement and Long-Term Growth," *European Journal of Political Economy* 12, no. 3 (1996): 503–32.
[19] CAA § 201–19; U.S.C. § 7521–54.
[20] EPA, "Automobiles and Ozone," EPA 400 F-92-006, January 1993, http://www.epa.gov/otaq/consumer/04-ozone.pdf.

considering the research of economists Daniel Khazzoom and Leonard Brookes,[21] who observe that "increases in energy efficiency can lead to increased, not decreased, energy consumption."[22] Increased fuel efficiency lowers the cost of using fuel, which leads consumers to demand more of it. Therefore, increased fuel consumption will at least partially offset, if not more than completely offset, the environmental benefit of lower emissions per unit of fuel consumed.

According to the EPA, the Clean Air Act is the main EPA regulation that affects the automobile industry.[23] Corporate Average Fuel Economy (CAFE) standards, which set minimum levels of fuel efficiency for new automobiles, are also an important environmental regulation that affects the industry. The NHTSA enforces CAFE standards, while the EPA determines the standards.[24] In 2010, the minimum standard for new passenger cars was 27.5 miles per gallon, although larger vehicles such as trucks and minivans could obtain 23.5 miles per gallon.[25] The EPA estimates that these standards impose costs on manufacturers, which means that in the absence of regulation, automobile manufacturers and consumers would prefer less fuel-efficient vehicles. It estimates that increasing fuel economy standards to 33.3 miles per gallon beginning in 2012 and to 37.8 miles per gallon in 2016 (25.4 and 28.8 miles per gallon, respectively, for light trucks) would cost manufacturers roughly $695 per passenger car

[21] J. Daniel Khazzoom, "Economic Implications of Mandated Efficiency Standards for Household Appliances," *Energy Journal* 11, no. 2 (1980): 21–40; J. Daniel Khazzoom, "Energy Saving Resulting from the Adoption of More Efficient Appliances," *Energy Journal* 8, no. 4 (1987): 85–89, http://www.jstor.org/stable/41322298; J. Daniel Khazzoom, "Energy Savings from More Efficient Appliances: A Rejoinder," *Energy Journal* 10, no. 1 (1989): 157–166, http://ideas.repec.org/a/aen/journl/1989v10-01-a14.html; Leonard Brookes, "Energy Efficiency and Economic Fallacies," *Energy Policy* 18, no. 2 (March 1990): 783–85.
[22] Harry D. Saunders, "The Khazzoom-Brookes Postulate and Neoclassical Growth," *Energy Journal* 13, no. 4 (1992), http://www.jstor.org/stable/41322471. Khazzoom and Brookes apply ideas originally introduced by William Stanley Jevons in his book *The Coal Question* (London: Macmillan, 1865).
[23] EPA, "Automotive Repair and Maintenance Sectors (NAICS 8111): Laws and Regulations," April 12, 2013, http://www2.epa.gov/regulatory-information-sector/automotive-repair-and-maintenance-sectors-naics-8111.
[24] KPMG International, *The Transformation of the Automotive Industry: The Environmental Regulation Effect* (KPMG International, 2010), 1, http://www.kpmg.com/cn/en/issuesandinsights/articlespublications/pages /transformation-automotive-industry-o-201001.aspx.
[25] NHTSA, *Summary of Fuel Economy Performance* (Washington, DC: NHTSA, April 28, 2011).

(and $362 per light truck). Consumers would partially incur those costs through higher prices of new automobiles.[26]

CAFE standards, like other regulations that aim to increase fuel efficiency, have ambiguous environmental effects. Economist Molly Espey finds that CAFE standards increase emissions overall, because the increase in driving more than offsets the decrease in emissions. She suggests that only a substantial increase in fuel taxes could decrease emissions to a level below what existed before CAFE standards were put in place.[27] Further, research has shown that people usually respond to technological advances that enable greater fuel efficiency by demanding more power-intensive features on cars, such as more horsepower, all-wheel drive, and air conditioning.[28] Therefore, an increase in fuel efficiency does not necessarily reduce emissions since features that consume energy will offset the fuel savings per mile driven. Researchers have also argued that the simplest way for automobile manufacturers to meet CAFE standards is to produce lighter cars, and that the supply of lighter cars (and the resulting decrease in cost relative to the decreasing supply of larger vehicles) induced by CAFE standards has increased the likelihood of injury or death from an accident, which has consequently increased the death and injury rate from automobile accidents.[29]

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[26] NHTSA, *Final Regulatory Impact Analysis: Corporate Average Fuel Economy for MY2012–MY2016 Passenger Cars and Light Trucks* (Washington, DC: Office of Regulatory Analysis and Evaluation, National Center for Statistics and Analysis, March 2010).

[27] Molly Espey, "Pollution Control and Energy Conservation: Complements or Antagonists? A Study of Gasoline Taxes and Automobile Fuel Economy Standards," *Journal of Energy* 18, no. 2 (1997): 23–28, http://ideas.repec.org/a/aen/journl/1997v18-02-a02.html.

[28] Daniel Sperling et al., *Analysis of Auto Industry and Consumer Response to Regulations and Technological Change, and Customization of Consumer Response Models in Support of AB 1493 Rulemaking* (Davis, CA: Institute of Transportation Studies, University of California at Davis, June 1, 2004), 3, http://www.escholarship.org/uc/item/69j1q8p1.

[29] Robert W. Crandall and John D. Graham, "The Effect of Fuel Economy Standards on Automobile Safety," *Journal of Law and Economics* 32, no. 1 (1989): 97–118, http://www.jstor.org/stable/725381.

Environmental regulations also impose costs on consumers since automobile consumers must pay for features that limit the environmental impact of automobile manufacturing and of the automobiles themselves. As with worker safety regulations, environmental regulations only impose costs on consumers to the extent that they force consumers to purchase features that they would not have purchased in the absence of regulation.

Consumers may pay for environmental quality in the absence of regulation that requires them to do so, even though the benefits of reducing driving's environmental impact accrue almost entirely to society in general while the driver enjoys an imperceptible amount of that benefit. Some have argued that the recent popularity of hybrid vehicles shows that people will pay more for a vehicle that they perceive as having a comparatively low environmental impact.[30] Therefore, environmental quality can potentially be a normal good in the same sense that workplace safety is a normal good—that is, people will purchase more products that they perceive to benefit the environment (or at least harm it to a lesser extent than comparable products) as their incomes rise.[31] In other words, lower-income consumers will be less likely to purchase cars with improved environmental performance whereas higher-income consumers are more likely to buy these cars even in the absence of regulation. Therefore, the environmental mandates are likely to impose a greater burden on consumers with the lowest incomes.

Consumer Safety Regulations

Finally, the federal government requires that automobiles possess numerous safety features, including seat belts and airbags. Automobile accidents are common, and they resulted in over

[30] Daniel Sperling et al., "The Price of Regulation," *Access* 25 (2004): 17, http://www.its.ucdavis.edu/publications/2004/UCD-ITS-RR-04-32.pdf.
[31] See Nemat Shafik, "Economic Development and Environmental Quality: An Econometric Analysis" (Oxford Economic Papers, New Series 46, 1994), 758, http://www.jstor.org/stable/2663498.

2.2 million injuries and nearly 33,000 fatalities in 2010.[32] Mandatory safety features reduce the likelihood that an accident will result in an injury or fatality, and mitigation of negative externalities can also justify these regulations. An individual endangers herself by driving recklessly, but she also endangers others, so the government may be justified in taking action to prevent the possibility that one person's reckless driving will injure or kill someone else.[33] On the other hand, individuals should know their own subjective willingness to risk being injured or killed as a result of driving and can purchase an amount of protection in the form of insurance or safety equipment to make them willing to drive. After all, people would not drive at all if drivers were not willing to accept any risk of injury or death. Nonetheless, some behavioral economists argue that people do not properly assess the risks of driving and are overly optimistic about their safety on the road, and they thus argue that the government must make safety equipment mandatory.[34]

Federal regulations also require automobile manufacturers to add safety features to cars and trucks in order to make them safer for consumers. According to the NHTSA, the following regulations apply to the automotive sector.

[32] Bureau of Transportation Statistics, *Pocket Guide to Transportation 2012* (Washington, DC: US Department of Transportation, January 2012), tables 1-4 and 1-5, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/pocket_guide_to_transportation/2012/pdf/entire.pdf.
[33] Aaron S. Edlin and Pinar Karaca-Mandic, "The Accident Externality from Driving" (Boalt Working Papers in Public Law, University of California at Berkeley, June 2003), 2, http://escholarship.org/uc/item/3c89518b#page-2.
[34] W. Kip Viscusi, Christopher DeMuth, and James Burnley, "Health and Safety Regulation," in *American Economic Policy in the 1980s*, ed. Martin Feldstein (Chicago: University of Chicago Press, 1994), 454–55, http://www.nber.org/chapters/c7758.pdf; Ted Gayer and W. Kip Viscusi, "Overriding Consumer Preferences with Energy Regulations," *Journal of Regulatory Economics* 43, no. 3 (2013): 248–64, http://connection.ebscohost.com/c/articles/86744946/overriding-consumer-preferences-energy-regulations.

Table 2. Federal Automotive Safety Regulations

Number	Name	Description
Part 531	Passenger Automobile Average Fuel Economy Standards	Establishes minimum fuel economy standards for passenger automobiles
Part 533	Light Truck Fuel Economy Standards	Establishes minimum fuel economy standards for light trucks
Part 541	Federal Motor Vehicle Theft Prevention Standards	Requires identifying numbers or symbols on specific car parts to facilitate recovery of stolen vehicles
Part 555	Temporary Exemption from Motor Vehicle Safety and Bumper Standards	Allows automobile manufacturers to obtain temporary exemption from motor vehicle safety laws in specific circumstances
Part 557	Petition for Hearings on Notification and Remedy of Defects	Establishes procedures for conducting hearings on whether vehicle manufacturers met their obligations to make dealers and consumers aware of safety-related defects
Part 564	Replaceable Light Source Information	Requires manufacturers to submit information on original vehicle light sources so as to facilitate their later replacement
Part 565	Vehicle Identification Number Requirements	Standardizes vehicle identification numbers
Part 566	Manufacturer Identification	Requires manufacturers of automobiles and automobile equipment to submit descriptions of what they produce and identifying information about the items to the Department of Transportation
Part 567	Certification	Specifies the content and location of certification labels
Part 568	Vehicles Manufactured in Two or More Stages	Requires manufacturers of incomplete vehicles to submit information about the standards applicable to the current and future stages of the vehicle's production
Part 569	Regrooved Tires	Regulates the distribution and sale of regrooved and regroovable tires
Part 570	Vehicle-in-Use Inspection Standards	Standardizes inspections of hydraulic brake systems, steering and suspension systems, and tire and wheel assemblies
Part 571	Crash Avoidance	Establishes minimum requirements for several automobile parts and requires the installation of many others, including seat belts, crash protection, and theft protection
Part 572	Anthropomorphic Test Devices	Regulates the design and performance of crash-test dummies
Part 573	Defect and Noncompliance Reports	Establishes requirements for regularly reporting incidents of defects and noncompliance to the NHTSA
Part 574	Tire Identification and Record Keeping	Requires that new tire manufacturers and dealers maintain records and identification of those who purchase new tires
Part 575	Consumer Information Regulations	Requires manufacturers to disclose certain information about vehicles to the first purchasers of those vehicles
Part 577	Defect and Noncompliance Notification	Requires manufacturers to inform vehicle owners of defects or noncompliance with federal standards that relate to their vehicle
Part 579	Defect and Noncompliance Responsibility	Requires manufacturers to recall vehicles and parts not built according to federal standards

Number	Name	Description
Part 580	Odometer Disclosure Requirements	Requires that vehicle owners who sell their vehicle disclose its mileage in writing to the purchaser
Part 581	Bumper Standard	Establishes minimum impact resistance for vehicles in low-speed collisions
Part 582	Insurance Cost Information Regulation	Requires automobile dealers to disclose the differences in insurance costs for different makes and models of vehicles
Part 583	Automobile Parts Content Labeling	Requires manufacturers to disclose the country of origin of equipment in new vehicles
Part 591	Importation of Vehicles and Equipment Subject to Federal Safety, Bumper, and Theft Prevention Standards	Requires that imported motor vehicles and motor vehicle parts conform to federal standards
Part 595	Retrofit On–Off Switches for Air Bags	Specifies the conditions under which such switches may be installed

Source: US Department of Transportation, National Highway Traffic Safety Administration, "Federal Motor Vehicle Safety Standards and Regulations," accessed October 16, 2013, http://www.nhtsa.gov/cars/rules/import/fmvss.

Both economic theory and empirical research suggest that drivers take less caution as cars become safer. Drivers of cars equipped with air bags and seat belts realize that an accident will be less costly for them than it would be in a more dangerous vehicle, and they consequently behave less cautiously.[35] Economist Sam Peltzman argues that the risk of injury or death from driving depends on the vehicle's safety, how much people drive, and how carefully they drive. He argues that people generally will tolerate a specific amount of risk from driving, so drivers respond to safer vehicles by driving more often and exercising less caution.[36] Economists Russell Sobel and Todd Nesbit empirically tested Peltzman's hypothesis by analyzing the behavior of NASCAR drivers when cars are made safer. Their findings indicate that drivers do indeed become less cautious and more prone to accidents as vehicles

[35] W. Kip Viscusi and Gerald O. Carvallo, "The Effect of Product Safety Regulation on Safety Precautions," *Risk Analysis* 14, no. 6 (1994): 917–30, http://law.vanderbilt.edu/files/archive/143_The_Effect_of_Product_Safety_Regulation.pdf. See also Alison Smiley, "Auto Safety and Human Adaptation," *Issues in Science and Technology* (Winter 2000): 70–76, http://www.issues.org/17.2/smiley.htm.

[36] If people's demand for safety increases, then they will purchase safer cars, drive less, and drive more carefully, but they will do so even in the absence of regulation.

become safer.[37] Marginal analysis helps explain why drivers behave this way. People engage in behavior to the point that the marginal cost equals the marginal benefit. Accordingly, people take on risk up until the point that any additional risk-taking outweighs its benefit. When the cost of taking on risk decreases, as it does when manufacturers add safety features to automobiles, the level of risk-taking will increase.

Government-imposed minimum standards for consumer safety mean that poorer individuals, for whom automobile payments consume a relatively large portion of their income, cannot choose to forego safety features in order to use their money for other purchases. That means they must either forego other necessities or forego driving altogether, neither of which is a desirable option. Wealthier individuals are more likely to pay to mitigate even small risks since doing so requires them to expend a comparatively small portion of their income. Less wealthy individuals, on the other hand, are more likely to tolerate more risk since doing so frees up their limited income to address more serious concerns, such as obtaining adequate food and shelter, and to reduce more serious risks that have a high probability of leading to injury, sickness, or death. The fact that people must pay for safety features—including those that mitigate remote risks—regardless of their income means that the cost of regulation falls disproportionately on less wealthy individuals.[38]

III. Costs of Regulation to Consumers

Consumers inevitably incur a portion of the costs of automobile regulation, but determining exactly how much consumers pay as a result of regulations is complicated. As discussed in

[37] See Russell S. Sobel and Todd M. Nesbit, "Automobile Safety Regulation and the Incentive to Drive Recklessly: Evidence from NASCAR," *Southern Economic Journal* 74, no. 1 (2007): 71–84, http://homepages.wmich.edu/~alexande/econ345/readings/nascar.pdf.

[38] Diana Thomas, "The Regressive Effects of Regulation" (Working Paper No. 12-35, Mercatus Center at George Mason University, Arlington, VA, November 2012), 8, http://mercatus.org/sites/default/files/RegressiveEffects_Thomas_v1-0.pdf.

previous sections, the main regulations that affect the automobile industry are labor regulations, environmental regulations, and consumer safety regulations. Improvements in all these areas will occur over time with or without regulation; in developed countries, as the economy grows and incomes increase, people become more willing to compensate automobile manufacturers for making automobiles safer and cleaner, and workers willingly forego wage and salary increases in exchange for safer working conditions.[39]

Estimates vary on the precise cost of safety regulations to consumers. Andrew Burke, Ethan Abeles, and Belinda Chen report that in 2001, Ward's Automotive Yearbook estimated that consumers paid roughly $4,018 more per automobile than they would have in the absence of regulation,[40] which represented roughly 19 percent of the average price of a new vehicle in that year ($24,522).[41] Professor Daniel Sperling disputes that figure and calculates that the price consumers pay for regulation is roughly $2,500 more per vehicle, $1,000 of which is due to emissions regulations and $1,500 of which is due to safety regulations.[42] These expenses amount to 12 percent of a new vehicle's cost. Research economist Wayne Dunham estimates that environmental and safety regulations added $1,400 and $900 respectively to the final price of automobiles in 1991,[43] which is $2,300 total and which represented 13.8 percent of the final

[39] Ibid., 9–10.
[40] Andrew Burke, Ethan Abeles, and Belinda Chen, *The Response of the Auto Industry and Consumers to Changes in the Exhaust Emission and Fuel Economy Standards (1975–2003): A Historical Review of Changes in Technology, Prices, and Sales of Various Classes of Vehicles* (Research Report UCD-ITS-RR-04-04, Institute of Transportation Studies, University of California at Davis, 2004), 26, http://www.its.ucdavis.edu/?page_id=10063&pub_id=166.
[41] Vehicle Technologies Office (US Department of Energy), "Fact #541: October 20, 2008, New Car Prices: The Past 100 Years," Fact of the Week, February 27, 2013. The Department of Energy reports new car prices by year in constant 2007 dollars, so we adjusted the $4,020 figure to 2007 dollars as well to arrive at this calculation. We adjusted for inflation using data from the Federal Reserve Bank of Saint Louis, "Gross Domestic Product: Implicit Price Deflator," March 28, 2013.
[42] Sperling et al., *Price of Regulation*, 17.
[43] Wayne R. Dunham, "Are Automobile Safety Regulations Worth the Price? Evidence from Used Car Markets," *Economic Inquiry* 35, no. 3 (1997): 579, http://onlinelibrary.wiley.com/doi/10.1111/j.1465-7295.1997.tb02034.x/abstract.

vehicle price.[44] The estimates from Ward's Automotive Yearbook, Sperling, and Dunham suggest that automobile prices are 13.5 percent to 23.5 percent higher than they would be without automobile regulations.[45]

The literature suggests that government regulations cause only a modest increase in automobile prices for the following reasons. First, automobiles have a high elasticity of demand since they are highly durable, meaning that consumers can easily forego purchasing a new vehicle if prices rise. Also, car payments account for a large portion of consumers' budgets, which makes consumers more responsive to changes in price and thereby limits producers' ability to pass costs on to consumers.[46] Moreover, the effects of regulation on costs are not necessarily cumulative, since restructuring production to add new features or upgrade existing ones requires temporary upfront expenditures that become less burdensome over time as they become integrated into the production process.[47] Finally, the industry's structure resembles monopolistic competition, meaning that each manufacturer essentially produces a unique good for which it can set the price, which makes automobile prices less responsive to changes in costs for the producer. Because consumers perceive the goods as unique, firms can earn profits on those goods that exceed what they could earn under a situation of perfect competition, in which firms would pass all costs on to the consumer.[48] However, the dollar value that consumers pay for regulation understates the cost of regulations to society in general.

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[44] Authors' calculations, following the same procedure as explained in note 41.
[45] Estimates for the cost of regulations range from 12 percent to 19 percent of the cost of a new vehicle. That means, for instance, that a $1,000 car would cost between $810 and $880 in the absence of regulation. An increase in price to $1,000 from $810 or $880 would represent a 23.6 percent or a 13.6 percent increase, respectively, which is how the authors determined these figures.
[46] James Wetzel and George Hoffer, "Consumer Demand for Automobiles: A Disaggregated Market Approach," *Journal of Consumer Research* 9, no. 2 (1982): 196.
[47] See Sperling et al., *The Price of Regulation*, 17; and Burke, Abeles, and Chen, *Response of the Auto Industry*, 25.
[48] Sperling et al., *Price of Regulation*, 16.

The actual monetary cost of regulation to consumers could, theoretically, be zero, provided that the regulation does not change the final product from what the manufacturer would have produced in the absence of the regulation. For example, if a state or country required that automobiles permit the driver to see outside, it is unlikely that such a regulation would affect the automobile's cost since an automobile that did not permit the driver to see outside would serve no purpose. Producers would not manufacture such cars and consumers would not buy them, regardless of the law. While that is perhaps an extreme example, some regulations likely require producers or consumers to make decisions that they would have made in the absence of regulation. The law may require a level of safety or environmental quality that is below the level that the market would provide without regulation, for example, in which case the regulation will not affect the final product or its price.

Most regulations do affect the final product, however. They generally require producers to add features to automobiles that would not have existed otherwise, and consumers then must compensate the producer for adding those features even though the consumer probably would not have been willing to pay for those features otherwise.[49] Automobile prices are consequently higher than they would be in the absence of federal regulation, since producers incur costs to comply with the regulation and then pass those costs on to consumers.

One way that the dollar cost of regulation understates regulation's full cost to consumers is that regulation may induce people to purchase different vehicles than they might otherwise prefer. For example, regulation may increase the demand for certain vehicles while lowering the demand for others. Fuel efficiency standards are less stringent for larger vehicles such as trucks, SUVs, and

[49] Sam Peltzman, "The Effects of Automobile Regulation," *Journal of Political Economy* 83, no. 4 (1975): 679. The market tends to provide what consumers want. If the market does not provide something (such as a safety feature), one must question whether consumers truly desire it given its cost.

minivans, so consumers may end up purchasing a larger car than they would have otherwise in order to avoid the higher up-front costs of lighter cars.[50] Consumers also may switch to older vehicles, to which the latest fuel-efficiency standards do not apply, in order to avoid paying the higher costs for the fuel efficiency of new vehicles. In such instances, consumers pay for regulation by driving different cars than they would prefer rather than by paying a higher price.[51]

On the supply side, regulation can increase the costs of supplying automobiles and therefore reduce their overall supply, which increases their price (assuming all other factors are held constant). This price increase would limit consumer choice at a given price point, but would also impact sales volume for the producer, who would sell fewer units at the higher price. When consumers forego driving due to the higher price, they do not incur a monetary cost. However, they do incur the inconvenience of having to find alternative means of transportation. Although consumers' subjective value of the car they drive, and their value of driving in general, does not entail a monetary cost, it is a real cost of regulation that must be taken into account when considering how regulation affects consumers.

IV. Conclusion

The prevalent production and use of automobiles raises legitimate concerns about workplace safety, the environment, and consumer safety. An easy and effective solution might be to ban the automobile altogether. Such a suggestion would be foolish, however, because of the many ways automobile production and use benefit society. Banning automobiles is far too costly for serious consideration.

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[50] Steven G. Thorpe, "Fuel Economy Standards, New Vehicle Sales, and Average Fuel Efficiency," *Journal of Regulatory Economics* 11, no. 3 (1997): 322.
[51] Dunham, "Are Automobile Safety Regulations Worth the Price?," 579.

Regulations are also costly, but the true cost is often hidden and difficult to quantify, whereas the potential benefits—which may or may not be realized—are easy to measure. It is easy to look at potential lives saved and celebrate the "necessity" of the regulations without considering their potential cost. Yet sometimes the harm regulation attempts to prevent is so probabilistically remote as to defy reason.[52] Compounding the confusion is the common assumption that a regulation has or will have the intended effect. Studies after the fact that show mediocre results from the regulation occur too late to reverse the harm done: factories have already modified production, producers have altered their contracts with suppliers, and consumers have foregone other spending opportunities to pay more for the automobiles meeting the regulations. As we have shown, the regulations may or may not achieve their desired ends.

While the expressed goals of regulation are important and deserve attention, attempting to create a safer and cleaner world through automobile regulation entails significant costs. To the extent that producers bear these costs, the result is a higher production cost, which may limit consumer choice to vehicles manufactured by the few producers who can afford to remain in the market. Workplace safety costs may reduce the number of available jobs or the amount of compensation that a company can offer its employees. These costs may also prevent new companies, who could provide more diverse offerings for the consumer, from easily entering the market. To the extent that consumers bear these costs, the result may be substitution to a less safe or less environmentally friendly older vehicle, or a driver may forego buying a vehicle altogether. Higher-income individuals are better able to absorb these cost increases and may have

[52] In "Regressive Effects of Regulation," Diana Thomas relates the case of the legislation requiring rearview cameras in all passenger vehicles by 2014. Rearview cameras reduce deaths at the rate of one person for each 1.5 million vehicles at a cost of $300 million per life saved.

demanded safer and more environmentally friendly vehicles anyway, which places the burden of regulation disproportionately on lower-income individuals.

While regulations appear to provide easy answers to the risks automobiles pose to workers, consumers, and the environment, they are not without substantial costs. As described above, these costs are not always evenly, or perhaps fairly, distributed and may be quite burdensome. The social impact of these costs is an important element to consider when new regulations are proposed.